$\int_0^\infty e^{-z}z^{n-2}dz=\Gamma(n)$, $z=x^2$, $n=\frac{1}{2}$, we find $2\int_0^\infty e^{-x^2}dx=\Gamma(\frac{1}{2})=\sqrt{\pi}$, which proves the assertion.

II. **Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Applied Science, Texarkana College, Texarkana, Arkansas-Texas.**

Let V=the required volume ; A=the required area.

$$\therefore\ V=\int\int\int dxdydz=\int\int zdxdy=\int_{-\infty}^{+\infty}\int_{-\infty}^{+\infty}e^{-(x^2+y^2)}\,dxdy.$$

$$\therefore\ V=\left[\int_{-\infty}^{+\infty}e^{-x^2}dx\right]\left[\int_{-\infty}^{+\infty}e^{-y^2}dy\right].\quad A=\int\int dxdz=\int zdy=\int_{-\infty}^{+\infty}e^{-x^2}dx.$$

$$\text{But}\int_{-\infty}^{+\infty}e^{-x^2}dx=\int_{-\infty}^{+\infty}e^{-y^2}dy.\quad \therefore V=\left[\int_{-\infty}^{+\infty}e^{-x^2}dx\right]^2=A^2.$$

III. **Solution by C. W. M. BLACK, A. M., Professor of Mathematics in Wesleyan Academy, Wilbraham, Massachusetts.**

$z=e^{-(x^2+y^2)}$. Applying formula for volume, $V=\int\int zdydx$, we have $V=4\int_0^\infty\int_0^\infty e^{-(n^2+y^2)}dydx$......(1). Also let $y=0$. Then $z=e^{-x^2}$ is the equation of section made by zx plane. Area$=2\int_0^\infty e^{-x^2}dx$........(2). Let this be equal to a......(3). Now put (1) in form of $V=4\int_0^\infty\int_0^\infty e^{-x^2}e^{-y^2}dydx$. Integrating with reference to y in accordance with (3), we have $V=2\int_0^\infty ae^{-x^2}dx=2a\int_0^\infty e^{-x^2}dx=a^2$, also in accordance with (3).

Professor William Hoover did not solve this problem but referred to Todhunter's Integral Calculus, Art. 204, where a good solution is given.

PROBLEMS.

49. **Proposed by B. F. BURLESON, Oneida Castle, New York.**

Find (1) in the leaf of the strophoid whose axis is a the axis of an inscribed leaf of the lemniscata, the node of the former coinciding with the crunode of the latter. Find (2) in a leaf of the lemniscata whose axis is b the axis a of an inscribed leaf of the strophoid, the node of the former also coinciding with the crunode of the latter.

50. Proposed by GEORGE LILLEY, Ph. D., LL. D., Principal of Park School, 329 East Second Street, N. Portland, Oregon.

A draw bridge, a feet in length, moves uniformly about a center axis. At the instant it began to open, a man stepped on the end; and, walking at a uniform rate in the straight line passing through its center, reached the opposite end just as it made n complete revolutions. Find the absolute path described by the man, and the ratio of his rate of motion in this path and the velocity of the end of the bridge. Apply the result to the case when $a=320$ and $n=2$.

MECHANICS.

Conducted by B. F. FINKEL, Springfield, Mo. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

30. Proposed by WILLIAM HOOVER, A. M., Ph. D., Professor of Mathematics and Astronomy, Ohio University, Athens, Ohio.

P is the lowest point on the rough circumference of a circle in a verticle plane at which a particle can rest, friction being equal to the pressure; to find the inclination of the radius through P to the horizon.

Solution by the PROPOSER.

If μ=the coefficient of friction, R=the normal reaction of the curve, μR= the friction, $=R$ by the problem. $\therefore$ $\mu=1$.

W being the weight of the particle, we have, resolving along the tangent and radius through P,

$$W\sin\phi=\mu R\ldots\ldots(1).$$

$$W\cos\phi=R\ldots\ldots(2).$$

These give $\tan\phi=\mu=1$, or $\phi=\frac{\pi}{4}$.

Excellent solutions of this problem were received from *PROFESSORS ALFRED HUME, O. W. ANTHONY*, and *E. L. SHERWOOD*.

31. Proposed by O. W. ANTHONY, M. Sc., Professor of Mathematics in New Windsor College, New Windsor, Maryland.

A perfectly elastic, but perfectly rough mass M and radius R, rotating in a verticle plane with an angular velocity of ω, is let fall from a height, a, upon a perfectly elastic, but perfectly rough horizontal plane. Determine the motion of the body after striking the plane. What will be its ultimate motion?

Solution by ALFRED HUME, C. E., D. Sc., Professor of Mathematics in the University of Mississippi, University P. O., Mississippi.

Let the angular velocity, ω, be in the direction of the motion of the hands of a clock.